

**WHAT IS CLAIMED IS:**

1       1. A method for decreasing required radio spectrum in a  
2 communication system using variable bandwidth, the method  
3 comprising:

4                 dividing radio frequencies of the communication system  
5 into a wideband channel radio frequency and narrowband channel  
6 radio frequencies; and

7                 communicating user data using both the wideband  
8 channel radio frequency and the narrowband channel radio  
9 frequencies.

1       2. The method of claim 1, wherein a higher frequency re-  
2 use factor is applied to said narrowband channel radio frequencies.

1       3. The method of claim 1, wherein at least in some cells of  
2 the communication system both the narrowband channel radio  
3 frequencies and the wideband channel radio frequency are allocated  
4 so that the narrowband channel radio frequencies are used to extend  
5 cell range.

1       4. The method of claim 1, wherein the narrowband channel  
2 radio frequencies are divided among adjacent communication cells in  
3 such a way that adjacent cells are using different narrowband channel  
4 radio frequencies.

1       5. The method of claim 1, wherein the narrowband channel  
2 radio frequencies are located outside the wideband channel.

1       6.     The method of claim 5, wherein the narrowband channel  
2     multiple access method incorporates spreading as a means to  
3     implement spectrum sharing between adjacent cells.

1       7.     The method of claim 1, wherein the narrowband channel  
2     radio frequencies are located inside the wideband channel radio  
3     frequency.

1       8.     The method of claim 1, wherein at least one of the  
2     communication cells includes a repeater configured to operate using  
3     both wideband channel radio frequencies and narrowband channel  
4     radio frequencies.

1       9.     The method of claim 1, further comprising transmission  
2     of communication scheduling information using a narrowband channel  
3     radio frequency.

1       10.    The method of claim 9, wherein scheduling information  
2     includes terminal identity for a terminal that will use a channel.

1       11.    The method of claim 1, wherein use of the wideband  
2     channel radio frequency is coordinated.

1       12.    The method of claim 1, wherein the narrowband channel  
2     radio frequencies are assigned to different communication cells.

1       13.    A wireless communication system using variable  
2     bandwidth to increase re-use of frequency channels in the wireless  
3     communication system, the system comprising:

4              a mobile station having a receiver and a transmitter, the  
5     receiver and transmitter being configured to adaptively sample  
6     frequency and bandwidth; and

7               a base station having a receiver and a transmitter, the  
8 receiver and transmitter being configured to adaptively sample  
9 frequency and bandwidth.

1               14. The system of claim 13, wherein communication  
2 between said mobile station and said base station can take place  
3 utilizing at least two different frequency carrier bandwidths;  
4 narrowband and wideband.

1               15. The system of claim 14, wherein narrowband carriers are  
2 used in communication between the mobile station and base station  
3 to enable higher re-use of frequency channels without multiplying  
4 operator spectrum requirements.

1               16. The system of claim 14, wherein the narrowband carriers  
2 are outside a full bandwidth channel.

1               17. The system of claim 16, wherein the narrowband carrier  
2 or narrowband carriers outside the full bandwidth channel implement  
3 spreading.

1               18. The system of claim 14, wherein the narrowband carriers  
2 are inside a full bandwidth channel.

1               19. The system of claim 14, wherein the mobile station  
2 utilizes multiple antennas.

1               20. A device operable in a wireless communication  
2 environment and configured to utilize variable bandwidth, the device  
3 comprising:  
4                a radio interface configured to communicate with base  
5 stations in a wireless communication environment; and

6                   a processor coupled to the radio interface, the processor  
7   providing commands to modulate at least two transmission and  
8   receive bandwidths: wideband and narrowband.

1                 21. The device of claim 20, wherein the narrowband carriers  
2   are inside a full bandwidth channel.

1                 22. The device of claim 20, wherein the narrowband carriers  
2   are outside a full bandwidth channel.

1                 23. The device of claim 22, wherein the narrowband carrier  
2   or narrowband carriers outside the full bandwidth channel implement  
3   spreading.

1                 24. The device of claim 20, further comprising multiple  
2   antennas.